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REMARKS

Claims 1-8, 16-28, and 37 are pending. Claims 9-15 and 30-36 have been canceled pursuant to their withdrawal from consideration, without disclaimer, and subject to applicant's right to pursue claims directed to the canceled subject matter in a divisional application. Claim 1, 16, 22, and 37 are in independent form.

CLAIM 1

In the action mailed November 30, 2006, claim 1 was rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 4,517,280 to Okamoto et al. (hereinafter "Okamoto"). Claim 1 has been amended to recite subject matter drawn from former claim 2, which was also rejected under 35 U.S.C. § 102(b) as anticipated by Okamoto.

As amended, claim 1 relates to a method that includes patterning a substrate with a substantially arbitrary arrangement of features by introducing irregularity into an array of repeating lines and spaces between the lines. Introducing the irregularity includes forming an arbitrary figure in a photoresist above the array.

The rejections of claims 1 and 2 were based on the contention that Okamoto introduces irregularity into an array of repeating lines and spaces. Applicant respectfully disagrees.

In this regard, Okamoto is directed to "making a diffraction grating having a desired period and size in a desired location." *See, e.g., Okamoto*, col. 1, line 6-8. A diffraction grating is a collection of "periodic ridges and grooves [that] are formed on the substrate." *See, e.g., Okamoto*, col. 1, line 64-66.

To form a diffraction grating on a substrate, Okamoto first forms a diffraction grating in a layer of photoresist. *See, e.g., Okamoto*, col. 3, line 15-18. A second layer of photoresist is applied and exposed. *See, e.g., Okamoto*, col. 3, line 19-20. The exposure pattern is chosen so that the portion of the grating that is to be transferred to a substrate is exposed. *See, e.g., Okamoto*, col. 3, line 30-33. The substrate is subsequently etched to leave a periodic diffraction grating in the substrate. *See, e.g., Okamoto*, col. 3, line 50-54; col. 4, line 48-51.

Since the features in Okamoto's gratings are periodic, they are not a substantially arbitrary arrangement of features, as recited in claim 1. Rather, periodic features are constrained to have a fixed period. Moreover, nowhere does Okamoto describes that irregularity is introduced into the periodic structure of Okamoto's gratings. Rather, the gratings themselves are etched into the substrate.

Since Okamoto does not describe or suggest elements and/or limitations recited in claim 1, anticipation has not been established. Accordingly, Applicant respectfully requests that the rejections of claim 1, and the claims dependent therefrom, be withdrawn.

Former claim 2 was also rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 6,337,175 to Yamaguchi (hereinafter "Yamaguchi").

The rejection of former claim 2 was based on the contention that Yamaguchi describes the introduction of irregularity into an array of repeating lines and spaces between the lines by forming an arbitrary figure in a photoresist above the array.

Applicant respectfully disagrees. In this regard, Yamaguchi describes a patterning technique in which a single resist layer is applied to a substrate. *See, e.g., Yamaguchi*, col. 5, line 9-11; FIG. 1, positive resist 2; FIG. 8, negative resist 7; FIG. 15, positive resist 2; FIG. 19, positive resist 2.

The single resist layer is then patterned into a line-and-space pattern. *See, e.g., Yamaguchi*, col. 5, line 57-62; FIG. 2, resist pattern 2a; FIG. 9, resist pattern 7a; FIG. 16, resist pattern 2a; FIG. 20, resist pattern 2a.

In some cases, the line-and-space pattern is then covered with a resin that contains an acid generator. *See, e.g., Yamaguchi*, col. 5, line 64-66; FIG. 3, resin 6; FIG. 10, resin 8; FIG. 17, resin pattern 8. Otherwise, the line-and-space pattern is left uncovered. *See, e.g., Yamaguchi*, FIG. 21 and the written description thereof.

Regardless of whether a resin is used, unwanted areas in the line-and-space pattern in this single resist layer are then selectively exposed and developed. *See, e.g., Yamaguchi*, col. 6, line 3-9; col. 6, line 18-23; FIG. 4, resist pattern 2b; FIG. 11, resist pattern 7b; FIG. 18, resist pattern 2b; FIG. 22-23, resist pattern 2b. **Thus, in every case, a single resist layer is used to form both the line-and-space pattern and the selectively exposure of unwanted areas.**

Since Yamaguchi describes that a single resist layer is exposed and developed twice, Yamaguchi neither describes nor suggests that irregularity is introduced into an array of repeating lines and spaces between the lines by forming an arbitrary figure in a photoresist above the array. Instead, any irregularity introduced by Yamaguchi is performed within the line-and-space pattern.

Since Yamaguchi does not describe or suggest elements and/or limitations recited in claim 1, anticipation has not been established. Accordingly, Applicant respectfully requests that the rejections of claim 1, and the claims dependent therefrom, be withdrawn.

CLAIM 16

Claim 16 was rejected under 35 U.S.C. § 102(b) as anticipated by Okamoto. Claim 16 has been amended to recite subject matter drawn from former claim 18, which was also rejected under 35 U.S.C. § 102(b) as anticipated by Okamoto.

As amended, claim 16 relates to a method that includes interfering electromagnetic radiation to illuminate a substrate with an interference pattern, and introducing irregularity into the interference pattern to impart an arbitrary feature arrangement to the substrate. The interference pattern imparts a first photoresist on the substrate with repeating lines and spaces. Introducing irregularity includes forming an arbitrary figure in a second photoresist above some portion of the repeating lines and spaces.

The rejections of claims 16 and 18 were based on the contention that Okamoto introducing irregularity into an interference pattern to impart an arbitrary feature arrangement to the substrate. Applicant respectfully disagrees.

In this regard, as discussed above, Okamoto is directed to making periodic diffraction gratings on a substrate. Since the features in Okamoto's gratings are periodic, no irregularity has been introduced, as recited in claim 16. Therefore, anticipation has not been established. Accordingly, Applicant respectfully requests that the rejections of claim 16, and the claims dependent therefrom, be withdrawn.

CLAIM 22

Claim 22 was rejected under 35 U.S.C. § 103(a) as obvious over Okamoto and European Patent Application No. 0915384 to Canon Kabushiki Kaisha (hereinafter "Canon"). Claim 22 has been amended to recite a portion of the subject matter formerly recited in claim 29, which was also rejected under 35 U.S.C. § 103(a) as obvious over Okamoto and Canon.

As amended, claim 22 relates to a method that includes patterning a substrate using a first lithographic technique, the patterning providing lines and spaces in a first layer with a first pitch yielding a first k_1 factor smaller than or equal to 0.5, and breaking the continuity of at least some of the lines and spaces on the substrate by printing an arbitrary figure in a photoresist layer using a second lithographic technique providing second features with a second pitch. The second pitch is two or more times larger that the first pitch.

The rejection of former claim 29 was based on the contention that it would have been obvious for one of ordinary skill to have arrived at the recited subject matter in light of Okamoto and Canon.

Applicant respectfully disagrees. In this regard, as discussed above, Okamoto is directed to making periodic diffraction gratings on a substrate. There are no breaks in the continuity of the lines and spacings in these diffraction gratings. Moreover, there is no reason to believe that one of ordinary skill would depart from Okamoto's intended purpose of making periodic diffraction gratings to break the continuity of at least some of the lines and spaces by printing an arbitrary figure in a photoresist layer, as recited in claim 22.

Moreover, even if one of ordinary skill had sought to break the continuity of lines and spaces in Okamoto's periodic diffraction gratings by printing an arbitrary figure in a photoresist layer, there is no reason to believe that one of ordinary skill would consider Canon relevant to this undertaking. In this regard, Canon describes a system that uses multiplex exposure amounts to produce a pattern *in a single layer of photoresist*. *See, e.g., Canon*, para. [0106]. Multiplex exposure amounts are achieved when three or more exposure levels (including zero level exposures) are used. This

contrasts with the two exposure levels of a binary exposure levels system. *See Canon*, para. [0032]. FIGS. 8A, 8B, 9A, 9B of Canon illustrate Canon's use of multiple exposure levels. In particular, the exposure levels denoted "0" and "1" are below the threshold exposure level "E_{th}" whereas the exposure levels denoted "2" and "3" are above the threshold exposure level "E_{th}." The threshold exposure level "Eth" demarcates regions of the photoresist that print from regions of the photoresist that do not print. *See, e.g., Canon*, FIGS. 3A, 3B.

Since Canon deals with a single layer of photoresist (albeit with multiple exposure levels), Canon neither describes nor suggests breaking the continuity of lines and spaces in Okamoto's periodic diffraction gratings by printing an arbitrary figure in a photoresist layer, as recited in claim 22.

Accordingly, claim 22 is not obvious over Okamoto and Canon. Applicant respectfully requests that the rejections of claim 22, and the claims dependent therefrom, be withdrawn.

CLAIM 37

New claim 37 has been added by way of the present amendment. To advance prosecution, the patentability of claim 37 over Okamoto and Yamaguchi is now addressed.

Claim 37 relates to a method that includes patterning a first layer of photoresist on a substrate using interference lithography to provide a collection of periodic lines and spaces having a first pitch, patterning a second layer of photoresist using a second lithographic technique to provide an arbitrary feature with a second pitch, and etching the substrate to transfer a superposition of the lines and spaces provided by patterning the first layer and the arbitrary feature provided by patterning the second layer to the substrate. The second pitch is two or more times larger that the first pitch. The continuity of at least one of the lines and spaces is broken in the transferred superposition.

As discussed above, Okamoto is directed to making periodic diffraction gratings on a substrate. The continuity of the lines and spacings in such diffraction gratings is not broken. Rather, the lines and spacings are periodic and continuous. Accordingly, Okamoto neither describes nor suggests the transfer of a superposition in which the continuity of at least one of the lines and spaces patterned using interference lithography is broken, as recited in claim 37.

As for Yamaguchi, Yamaguchi describes that a single layer of photoresist is exposed twice. Accordingly, Yamaguchi neither describes nor suggests the patterning of a first and a second layer of photoresist, as recited in claim 37.

Thus, claim 37 is believed to be patentable over Okamoto and Yamaguchi.

It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Attorney's Docket No.: 10559-880001 / P17482
Intel Corporation

Applicant asks that all claims be allowed. No fees are believed due at this time. Please apply any charges or credits, to Deposit Account No. 06-1050.

Respectfully submitted,

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Scott C. Harris
Reg. No. 32,030

BY
JOHN F. CONROY
REG. NO. 45,485

Fish & Richardson P.C.
PTO Customer No. 20985
12390 El Camino Real
San Diego, California 92130
(858) 678-5070 telephone
(858) 678-5099 facsimile

SCH/JFC/jhg
10702279.doc